Appeal Brief 6/1/01

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Janice Capuani
Name

Janice Capuani
Signature

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of: Takeuchi et al.

Serial No. 09/176,374

Filed: October 21, 1998

For: Wound Element Electrode Assembly Design
For Use in Prismatic Case Electrochemical Cells

Group: 1745

Examiner: T. Dove

APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. 1.192

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In accordance with the provisions of 37 C.F.R. 1.192 appellants submit the following:

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TABLE OF AUTHORITIES

I. This is an appeal of the final rejection of all the claims in the above referenced application.

II. Real Party in Interest

Wilson Greatbatch Ltd. is the real party in interest in this case.

III. There are no other appeals or interferences known to appellants that will have a direct bearing on this Board's decision in this appeal.

IV. Status Of The Claims

Claims 1-19 are pending in this application, claims 1-19 all stand rejected and no claims have been allowed.

In particular, twice amended claims 1, 5, 8, and 16 all stand rejected. Amended claims 11, 12, 13, and 19 all stand rejected, and claims 2, 3, 4, 6, 7, 9, 10, 14, 15, 17, and 18 all stand rejected. It is noted that twice amended claims 1, 5, 8, and 16 were filed subsequent to the final rejection, but will be entered by the Examiner upon filing a Notice of Appeal and an Appeal Brief, pursuant to the Advisory Action dated January 8, 2001. The claims as they now stand are presented in appendix A.

V. Summary of the Invention

The invention comprises prismatic, high rate electrochemical cells designated 10 and 210, each having an anode-cathode electrode sub-assembly.(pp.4, 13; Figs. 3, 5-7, 11-15) The two embodiments of prismatic cells 10 and 210 are substantially identical, except for the flat bottom wall 18 of cell 10, and the curved bottom wall 218 of cell 210, as shown in Figs. 1 and 11 respectively.(p.14) Prismatic means the cell casing has flat faced side walls, and the bottom and end walls which may be curved.(p.5)

The casing 12 of cell 10 is conductive such as stainless steel, and is configured to have a pair of flat faced parallel sidewalls 14, 16 joined by a bottom wall 18 and pair of end walls 20, 22 that meet the sidewalls 14, 16.(p.4) A conductive lid 24 hermetically seals the cell, and conductive casing 12 serves as one electrical terminal of the cell 10. (p.5)

The opposite polarity terminal of the cell 10 is provided by terminal pin 28 that extends from the lid 24, and is electrically insulated therefrom by an insulator 30. The lid 24 has an opening so that the casing 12 can be filled with an electrolyte; the opening is then sealed with a cap 32, as seen in Fig. 2.

The cell 10 has therein an anode-cathode subassembly 40 having a jellyroll configuration shaped to have a rectangular cross section, allowing it to be incorporated into a prismatic cell casing.(p.5, Figs. 5-7) The subassembly 40 has an elongated alkali metal anode, elongated solid cathode 44, and a separator 46 therebetween.(p.6) The subassembly 40 is formed by winding or folding the combination of elongated anode and cathode electrodes with separator therebetween, using a mandrel 68.(p.5) The anode 42 is encased or encapsulated in separator material 46, or the cathode 44 may be encased in separator material 46. As an alternative, a strip of separator material may be sandwiched between the cathode and anode (p.6).

Figs. 4-7 show at the innermost portion of the sub-assembly wherein the anode 42 is folded in upon itself to define a double wrap portion, or pocket, designated 50 in Fig. 4. The result of such folding is that in the event any damage or other impairment occurs after winding, for example while the mandrel 68 is withdrawn from the pocket 50, only facing sections of anode 42 contact one another, thus preventing any electrical short circuit in an electrochemical cell in which anode-cathode sub-assembly 40 is employed.(p.7) Stated differently, in the region of the subassembly where the separator 46 could be damaged, there is no anode-cathode interface, thereby preventing a short circuit.(p.7)

Alternatively, at the innermost portion of the subassembly, the cathode can be folded upon itself to define a double wrap portion or pocket similar to pocket 50 in the subassembly of Fig. 4.(p.7)

Figs. 5-7 are diagrammatic views illustrating this point. In these figures, anode 62 in Fig. 5 is representative of anode 42 in subassembly 40 of Fig. 4, and cathode 64 in Fig. 5 is representative of cathode 44 in Fig. 4. In Fig. 5, the anode includes the five sections of equal length, designated 62a, 62b, 62c, 62d, and 62e. The cathode 64 is shorter, as seen in Fig. 5, and includes the three sections of equal length designated 64c, 64d, and 64e. In an alternative embodiment, the cathode could be longer than the anode and folded upon itself to define the pocket.

The anode 64 is fabricated from a screen having an active material, such as lithium, on both sides of a screen.(p.8) The lithium is on both sides of the screen where the anode is on the inside of the wind and has cathode opposing both sides. The remainder of the anode has lithium on only one side, the side facing the active cathode material. Where the anode faces the case in on itself, the lithium is only on one side of the screen.(p.8) Figs. 5-7 show the electrode elements 62 and 64 as rectangular with parallel edges, but these elements may be scalloped shaped, so as to be suitable for use in a case with a half round configuration, as seen in Figs. 11-15. (p.8)

Fig. 6 shows the winding of the electrodes, which begins with anode 62 first being folded in upon itself. The separator covers the anode and may comprise one or more layers, shown in broken lines in Fig. 6.(p.8) The separator may also be sealed around one of the electrode elements forming a "bag" around the element. The wind is begun by using a mandrel 68 as shown in Fig. 7. As shown, the first fold is toward the anode where the anode is folded in upon itself, that is the segments indicated by reference numbers 62a and 62b are folded in upon themselves, thus forming a pocket about the mandrel 68. (Figs. 5 and 6). The

second fold is about the lateral intersection of the anode sections 62b and 62c, the third and fourth folds are about the lateral intersections between anode sections 62c, 62d, and 62e, and the corresponding lateral intersections are between cathode sections 64c, 64d, and 64e, respectively.(p.9) The wind continues until the subassembly shown in Fig.7 is completed.

The size of the mandrel 68 may be varied, and after the wind described above is completed, the mandrel 68 is removed from the subassembly 70. However, during removal of the mandrel 68 from the subassembly, the mandrel 70 can tear the separator, particularly if the wind of the cell is tight. (p.9) However, in the present invention any tear advantageously is inconsequential because no short circuit can develop in the cell. (p.9) This is due to the fact that in the region of the subassembly 70 where the mandrel 68 is removed, i.e., the region where a tear would most likely occur, only portions of the anode face one another, as seen in Fig. 7. Thus, regardless of the damage done to the separator during removal of the mandrel 68, the cell does not short circuit.(p.9) The same advantages are realized if the first fold of the wind causes the cathode to be folded upon itself, in a situation wherein the cathode is longer than the anode.

Figs. 8 and 9 illustrate in further detail the anode and cathode electrodes for use in the cell assembly of the present invention. Fig. 10 shows a completed anode-cathode subassembly including cathode 80 and anode 100 of Figs. 8 and 9.

Figs. 11 and 12 show a high rate prismatic cell 210 having a conductive casing 212, such as stainless steel, a pair of flat faced sidewalls 214, and 216 in an opposed substantially parallel relationship, joined by a curved bottom wall 218. (Figs. 11 and 12).

A pair of end walls 220, 222 meet the side walls 214, 216 at substantially rounded corners.(p.13) The casing 212 is completed with a hermetically sealed lid 224. Except for the curved bottom

wall 218 of cell 210 and the flat bottom wall 18 of cell 10, the two prismatic cells shown in FIGS. 1 and 11 are identical.(p.14) Thus cell 210 of Figs. 11 and 12 has an anode cathode subassembly 240, that is substantially similar to the previous embodiments, as seen in Figs. 13-15.

Anode-cathode subassembly 240 is provided with a curved surface 242 to accommodate the curved bottom wall 218 of cell casing 212.(p.14) In order to provide the curved surface 242 of subassembly 240, the anode and cathode electrodes together with the separator are provided with a scalloped formation along one edge thereof.(p.14, Figs. 13-15)

Shown in Fig. 13, anode 250 comprises a pair of thin elongated alkali metal or lithium strips 252, 254 on opposite surfaces of a screen 256 of metal such as nickel.(p.14) The anode is formed as a plurality of scallops 262 along one edge thereof, each being of equal size and curvature, that is substantially equal to the curved surface 242 of the subassembly 240.(p.15) Thus, when the anode 250 and the cathode and separator are wound to form subassembly 240 in a manner similar to the winding of subassembly 130, the scallops 262 are in registry with one another. (p.15)

Fig. 14 shows a cathode 270 having a cathode active material 272 having a cathode current collector 274 embedded therein, such as a screen of titanium.(p.15) The cathode 270 is formed to have a plurality of scallops 278 along one edge thereof as seen in FIG 14. The scallops 278 are of equal size and curvature, and each has a curvature that is substantially equal to the curvature of the curved surface 242 of the subassembly 240.(p.15) Thus, when the cathode 270 and the anode and separator are wound to form subassembly, in a manner similar to that of subassembly 130, the scallops 278 are substantially in registry with one another. (p.15) Again, the cathode 270 may be encapsulated in separator material, or a separate strip of separator material may be provided.(p.15) The separator 286 is formed to have a plurality

of scallops 288 along an edge thereof, each of equal size and curvature, the curvature being substantially equal to the curvature of surface 242 of subassembly 240.(p.16) Thus, when the separator 286 along with the anode and cathode are wound to form subassembly 240, in a manner similar to that of subassembly 130, the scallops 288 are in substantial registry. (p.16)

The anode 250 and cathode 270 are placed in a face to face relationship wherein the scallops 262 and 278 are in registry.(p.16) Since anode 250 is longer than cathode 270, upon winding a double wrap portion or pocket is formed. (p.16) The assembly is wound, with the first fold being the anode folded upon itself.(p.16, Figs. 13-15)

VI. Issues On Appeal

A. Are twice amended claims 5, 8, and 16 indefinite under 35 U.S.C. Section 112, second paragraph, for failing to point out and distinctly claim the subject matter appellants regard as the invention?

B. Are the pending claims 1-19 in this application obvious under 35 U.S.C. Section 103(a) as being unpatentable over U.S. Pat. No. 4,709,472 to Machida et al. (hereinafter Machida), in view of U.S. Pat. No. 5,549,717 to Takeuchi et al. (hereinafter Takeuchi)?

VII. Grouping Of The Claims

Claims 1-10 may be grouped together and claims 13-19 may be grouped together.

VIII. Argument

1. Rejections under 35 U.S.C. Section 112, second paragraph (37 C.F.R. Section 1.192 (c)(8)(ii))

Twice amended claims 5, 8, and 16 stand rejected as under 35 U.S.C. Section 112 second paragraph, as being indefinite. Appellants do not believe these claims to be indefinite when considered in view of the written description and drawings. In particular, appellants believe these claims do particularly point out and claim the invention.

The subject matter of twice amended claim 5 is understood when read in conjunction with the associated specification and drawings. Except for the curved bottom wall 218 of cell 210 and the flat bottom wall 18 of the cell designated 10, the two embodiments of the prismatic cells shown in Figs. 1 and 11, respectively, are identical.(p.14) However, in the cell designated 210, sub-assembly 240 is provided with a curved surface 242 to accommodate the curved bottom wall 218 of cell casing 212.(p. 14) The anode and cathode electrodes together with the separator are provided with a scalloped formation along one edge thereof, in order to provide the curved surface 242 of sub-assembly 240. This scalloped configuration is shown in FIGS. 11-15.

The process of winding sub-assembly 240, or more particularly, the winding of the cathode 270 and anode 250 to form subassembly 240, is accomplished in a manner similar to the winding of the subassembly designated 130. (p.15) In fact, the winding is essentially the same for the subassemblies designated 240 and 130, with one difference being that electrodes in the subassembly designated 130 are rectangular shaped, whereas the electrodes in subassembly 240 are scalloped shaped (see FIGS. 5, 13, 14). Thus, the process of winding the sub-assembly

designated 240 is understood by considering the winding of the sub-assembly designated 130.

Turning now to Figs. 5, 6, and 7, shown therein is the winding of the sub-assembly designated 130. The winding of the cathode 64 and the anode 62 begins with the mandrel 68 at the lateral intersection of the anode sections 62a and 62b, as shown in FIGS. 5 and 6. The mandrel 68 has an axis extending through the length thereof. The anode 62 electrode and cathode 64 electrode are folded (wrapped) thereabout. The anode-cathode sub-assembly 130 is formed from folding the electrodes about the axis defined by the mandrel 68. The wrapping of sub-assembly 240 is accomplished in the same way.(p.15) In particular, the mandrel 68 is turned to wrap sub-assembly 240, and in doing so the electrodes anode 250 and cathode 270 and separator 286 are wound thereabout.

Turning now to twice amended claim 5, this claim calls for:

1. "The method of claim 1, wherein said anode and cathode sub-assembly has and axis in a plane about which said electrodes are folded and" - As discussed above, the axis passes though the mandrel 68.

2. The claim continues "is formed to have a curved edged surface that lies in a plane which is parallel to the plane containing the axis for conforming to a curved wall of a casing of an electrochemical cell containing said anode-cathode sub-assembly." The subassembly has a curved surface 242 that accommodates the curved bottom wall 218 of the cell casing 212, as seen in FIG. 11. Twice amended claim 5 states that the plane in which the axis is found is parallel to the plane in which the curved edged surface of the curved surface 242 of the subassembly 240 is found. Turning to FIG. 11, shown therein is a side elevational view of the anode-cathode sub-assembly 240. The side elevational view of Fig. 11 shows the curved edge surface of curved surface 242. As seen therein, the curved edge surface is

parallel to the plane in which the axis passing through the mandrel is found.

Thus, the language of claim 1 is not believed to be indefinite under 35 U.S.C. Section 112 second paragraph for failing to point out and distinctly claim the invention, when read in conjunction with the associated specification and drawings.

Rejected claims 8 and 16 have the same relevant language, and appellants reassert the above arguments for a finding that these claims are not indefinite under 35 U.S.C. Section 112 second paragraph.

2. Rejections under 35 U.S.C. Section 103 (37 C.F.R. Section 1.192 (c)(8)(iv))

Claims 1-19 stand rejected as being obvious under 35 U.S.C. Section 103(a) as being obvious over Machida in view of Takeuchi. A first step in a 35 U.S.C. Section 103 analysis is a study of the teachings of the cited references. In this scenario, the teachings of the cited references are as follows:

The Machida Reference - This reference shows a spiral electrode assembly that has a negative electrode 1 made of lithium and covered with a separator 2. The front edge of the separator 2 extends beyond the electrode 1, this being designated extension 2a and consisting of separator material only. The separator encloses the electrode as seen in FIG. 2 of that patent. Fig. 2 also shows extension 2a mounted on the flat surface of pin 3a, the pin 3a having a semicircular shape. Pin 3a cooperates with pin 3b to constitute a rotatable spool 3 having a generally cylindrical shape as shown in FIG. 3. As shown in Figs. 3 and 4, the other pin 3b is set to hold the extension 2a in the slot formed when pins 3a and 3b are brought together. In Fig. 4, the length of 2a1 is greater than one half

the length of the circumference of the spool, and also the length of 2a2 is greater than the circumference of the spool 3.

The spool 3 is then wound, as shown in Figs. 5 and 6, and the excess separator wound between and around the two part spool 3, the two parts indicated by reference numbers 3a and 3b. Then, the positive electrode member 4 is wound around the two part spool. The patent calls for a strong winding force (col. 5, lines 40-44) so that members 1, 2, and 4 can be tightly wound around the spool 3.

The Takeuchi Reference - This reference is drawn to a method for making a prismatic cell. Takeuchi shows a prismatic high rate cell having an electrically conductive casing 12 with flat sidewalls 14,16, and a bottom wall 18 and end walls 20,22. An anode and cathode sub-assembly 40 (shown in Figs. 3 and 4) has a jellyroll configuration and is positioned in the casing. The electrodes are wound around a rectangular mandrel. The cathode 44 and anode 42 are in a face to face relationship at the center of sub-assembly 40. This is shown in Figs. 4, 10, and 16-18 of that patent.

3. Features in the claims that are not found in the reference patents, that render the claims nonobvious (differences in claim features and the prior art).

In Graham V. John Deere Co., 383 U.S. 1, 17-18; 86 S.Ct. 684 (1966), the United States Supreme Court set forth the manner of conducting a 35 U.S.C. Section 103 obviousness analysis. Obviousness is a legal conclusion based on a totality of the evidence, and such analysis considers the following factors: the scope and content of the prior art; the level of skill in the prior art; the differences between the claimed invention and the prior art, and objective evidence of obviousness. Graham at 17-18; Richardson-Vicks Inc. v. Upjohn Co., 122 F.3d 1476, 1483; 44

U.S.P.Q.2d 1181 (Fed. Cir. 1997). The scope and content of the prior art references is discussed above, now the differences between the claimed invention and the prior art references cited by the Examiner are analyzed. An analysis of these differences is as follows:

Twice amended claim 1 part (c) calls for the folding of the electrodes "including a first step of folding the longer one of the electrodes on itself about the mandrel so that the separator on said longer one of the electrodes contacts both of said oppositely-facing surfaces of said mandrel..." This means that either the cathode electrode or the anode electrode (whichever is longer) is folded in on itself to create a pocket for the mandrel, wherein all the sides of the pocket are from the same electrode. This is simply not taught or disclosed in the Takeuchi reference, as Fig. 4 of that patent shows the anode electrode and cathode electrode not forming any such pocket. Rather, in that reference, the anode and cathode electrodes contact both sides of the mandrel. If there is any damage to the separator material during removal of the mandrel after winding a short circuit could result. This cannot happen in the present invention due to the protective pocket formed by a single electrode.

Turning to the Machida reference, that patent does not show or teach a "longer" electrode as called for in twice amended claim 1 part c), folded in upon itself. In that reference, the electrodes are substantially the same length, as seen in Figs. 5 and 6 of that patent. Thus Machida does not teach what twice amended claim 1 part (c) claims. These differences between the claimed invention and the prior art are believed to patentably distinguish Takeuchi and Machida, and weigh heavily in favor of a finding of nonobviousness.

Turning now to twice amended claim 1, part d), this portion of the claim calls for, upon removal of the mandrel, "only portions of the longer one of the electrode can contact each

other thereby preventing any short circuit." This aspect of the claim covers the protective pocket seen in Fig. 7 that surrounds the mandrel 68. Such a protective pocket formed from an electrode folded in upon itself is nowhere taught or shown by the Takeuchi reference. That is, Takeuchi does not show or teach that upon removal of the mandrel only portions of one of the electrodes can contact one another. Rather, Takeuchi is just the opposite, as upon removal of the mandrel in that device, the anode electrode and cathode electrode contact one another, thus increasing the likelihood of a short circuit. Hence, appellants believe that these differences make the claimed invention superior to the Takeuchi reference, and patentably distinguish the claimed invention over that reference.

Turning now to Machida, Machida does not show or teach a longer electrode as called for in twice amended claim 1 part d). Machida does show excess amounts of separator material (Fig. 6), but does not show a longer electrode for purposes of preventing short circuits. Indeed, Machida uses electrodes of substantially the same length.

Additionally, the claimed invention also differs from and is superior to the design disclosed in the Machida reference for additional reasons. A significant inherent problem with Machida is seen in FIGS. 2, 3, 4, 6, and 7 of that patent. Those figures show how the separator material 2 is captured between the opposing halves of a spool 3. A "strong winding force" (col.5, line 42) is used to wrap the electrodes around the spool. Of course, in such a winding, the separator material 2 is pinched tightly between the spool halves (indicated by reference numbers 3a and 3b and shown in Figs. 4-6 of that patent). When the spool 3 is then removed after winding, because the separator 2 is pinched between spool halves 3a and 3b, there is a great tendency for the entire electrode assembly to unravel as the spool halves designated 3a and 3b are pulled out of the assembly. In other words, the spool halves 3a and 3b will not readily release the

separator 2, since the separator 2 is pinched therebetween, and the associated pressures and friction thus generated will not readily release the mandrel when its removal from the assembly is attempted.

The claimed subject matter of the present invention does not have such problems, as a single electrode defines a rectangular pocket, such that removal of the mandrel does not unwind the electrode assembly. These differences between the claimed invention and the prior art are thus believed to patentably distinguish the Takeuchi and Machida references. Similarly, as claims 2-10 depend from twice amended claim 1, appellants reassert the above points and arguments for those claims. Thus, appellants believe that twice amended claim 1 is patentably distinguished from the prior art and therefore nonobvious.

Independent amended claim 11 calls for an electrode assembly, where at the "innermost portion of the assembly one of the electrodes is folded upon itself to define a substantially rectangular-shaped pocket with only separator therein so that in the event any portion of the separator within said pocket is damaged only portions of said one electrode can contact each other," thus preventing a short circuit. Takeuchi simply does not show or teach these aspects of the claim, that is a rectangular pocket defined by a single electrode. Machida does not show or teach an electrode folded upon itself, so as to define a rectangular pocket. Rather, it shows a spool 3 constructed from two halves 3a and 3b, for pinching a piece of separator 2 therebetween. Amended claim 11 is therefore patentably distinguished from Machida, as Machida does not show these aspects of amended claim 11. Again, amended claim 11 shows a superior design over Machida, as it avoids the tendency of the Machida sub-assembly to unravel upon removal of the mandrel, as previously discussed.

Amended claim 12, part b) calls for one of the "anode and cathode electrodes being shorter in length than the other of the

anode and cathode electrodes." Amended claim 12, part c) calls for "the longer of the electrodes being folded upon itself at the innermost portion of the assembly to include two substantially flat sections of the longer electrode facing each other with only a substantially flat section of separator therebetween." The Takeuchi reference simply does not disclose these structural features of amended claim 12. Machida does not show or teach anywhere "two substantially flat sections of the longer electrode facing each other," but rather shows a round, two part spool. These significant differences patentably distinguish amended claim 12 from the cited prior art references, and amended claim 12 provides a superior design as it avoids the problem of short circuits associated with mandrel removal after winding.

Amended claim 13 calls for "a configuration wherein at the innermost portion of the assembly one of the electrodes is folded upon itself to define a substantially rectangular-shaped pocket with only separator therein." These aspects of the claim are not found anywhere in the Takeuchi reference. Similarly, the Machida reference does not show or teach these aspects of amended claim 13. As previously described, the claimed configuration of the present invention wherein the electrode is folded in upon itself to define a rectangular pocket for the mandrel, is superior to the two part spool mandrel 3 of Machida, and the unraveling problems associated when removing the two piece spool 3 from that electrode assembly. These claimed differences in amended claim 13 patentably distinguish this claim from the Machida and Takeuchi references. Again, it is believed these differences also provide the device of amended claim 13 with a superior design, because the problems associated with mandrel removal are avoided. These same arguments are reasserted with respect to dependent claims 14-19.

Appellants thus believe that the present invention for a WOUND ELEMENT ELECTRODE ASSEMBLY DESIGN FOR USE IN PRISMATIC CASE ELECTROCHEMICAL CELLS as claimed is patentably distinguished from

and superior to the devices shown in the Takeuchi and Machida references. Thus claims 1-19 ought be allowed. Further, pursuant to the United States Supreme Court's guidance in Graham v.Deere, appellants believe these numerous differences weigh heavily in favor of a finding of nonobviousness of the claimed invention. Graham at 17-18.

4. Combining the References

All the claims pending in the application (1-19) stand rejected under 35 U.S.C. Section 103(a) based on the combination of the Takeuchi and Machida references. These references have been described and distinguished in the previous sections. The propriety of the Examiner's combination and use of these patents to deny appellants any patent is now considered.

It is well established law that an obviousness analysis includes a study of the following: scope and content of the prior art; the differences between the prior art and the claimed invention; and the level of ordinary skill in the art. Graham at 17-18. Also to be considered are the secondary factors including copying, long felt but unsolved need, and failure of others. Graham at 17-18. The content and scope of the prior art, as fully discussed and described above, all weigh heavily in favor of a finding of nonobviousness.

A nonobviousness analysis has additional aspects that must be considered, namely the propriety of combining references to deny patentability. The well established case law clearly demands that "when a rejection depends on a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references." In Re Denis Rouffet, Yannick Tanguy and Frederic Berthault, 149 F.3d 1350; 47 U.S.P.Q.2d 1453 (Fed. Cir. 1998);(citing In Re Geiger, 815 F.2d 686, 688; 2 U.S.P.Q.2d 1276 (1987). "When determining the patentablity of a claimed invention which combines two known

elements `the question is whether there is something in the prior art as a whole to suggest the desirablity, and thus obviousness, of making the combination.'"In Re Rouffet at 1355-1357; citing In Re Beattie, 974 F.2d 1309, 1311-12,24; 24 U.S.P.Q.2d 1040 (Fed. Cir. 1992)(quoting Lindemann Maschinenfabrik GMBH v. American Hoist and Derrick Co., 730 F.2d 1452, 1462; 221 U.S.P.Q. 481 (Fed. Cir. 1984).

The standard to be used is to prevent the use of hindsight to defeat patentability of the invention, requires the Examiner to show a motivation to combine the references that create a case of obviousness. "In other words, the Examiner must show reasons that the skilled artisan, when confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed." In Re Rouffet at 1357. Further, the Examiner must do this without using the claimed invention itself as a blueprint for piecing together prior art elements to defeat patentablity of the claimed invention. In Re Rouffet at 1357. Such an approach would be "an illogical and inappropriate process by which to determine patentablity." Sensonics, Inc. v. Aerosonic Corp., 81 F.3d 1566, 1570; 38 U.S.P.Q.2d 1551 (Fed. Cir. 1996).

Three sources exist to combine references, they are the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. In Re Rouffet at 1357. It must be kept in mind at all times that the "suggestion to combine references stands as a critical safeguard against any hindsight analysis and rote application of the legal test for obviousness." In Re Rouffet at 1358.

As seen from the plethora of court guidance, the undertaking of an obviousness determination is a serious task. In the present case, the applicable case law demands the Examiner point to some particular showing, teaching, or motivation to combine the Takeuchi and Machida references. In re Rouffet at 1355-

1357;(citing In Re Geiger at 688). The motivation to combine the Takeuchi and Machida references must not come from hindsight, nor may the claimed invention be used as a blueprint to piece together prior art elements to defeat patentablity. In Re Rouffet at 1357.

Thus, the Examiner must show why a skilled person in the art faced with the problem of short circuits in cell assemblies, would not only have selected, but then combined the Takeuchi and Machida references, to create the claimed invention. Further, an Examiner is prohibited from using the patent application itself as a blueprint to piece together prior art and defeat patentablity. In Re Rouffet at 1357.

Application of these principles to the present scenario, as discussed below, weighs heavily in a finding of nonobviousness. To begin, a person of ordinary skill in the art would not have been motivated to use the Takeuchi reference for several reasons. First, in that reference, the electrode assembly is wrapped such that the anode electrode 42 and the cathode electrode 44 of the subassembly 40 are in a directly contact one another, after winding by the mandrel. When the mandrel is removed, if a scratch develops on the separator that covers the anode and cathode, a short circuit can occur.

One of the problems solved by appellants' invention is the avoidance of short circuits in cells upon mandrel removal after winding. Takeuchi does not address that problem, let alone solve that problem. Thus, it is appellants' belief that a person of ordinary skill in the art would not have been motivated to use the Takeuchi reference, as it does not teach or solve the short circuit problem associated with mandrel removal from anode-cathode sub-assemblies. Rather, it teaches away from the claimed invention, and there is little to no motivation for one of ordinary skill in the art to use this reference. Thus, Takeuchi is not believed to be a significant prior art reference.

Turning to Machida, in that reference the mandrel is a two piece spool, each piece being shaped in the form of a half cylinder, one side having a curved side, the other side being flat. An extra long piece of separator material is sandwiched between the flat surfaces of the two piece spool mandrel. The two piece spool continues to pinch the separator, and is wound in a winding occurs such that the electrode assembly is tightly wound. The two piece spool is removed from the assembly. Upon removal there is a tendency for the electrodes to be unraveled, because the separator is still being pinched between the two halves of the spool, and friction and pressure inhibit the smooth release of separator and associated electrode from the spool halves. This pinching is due to the "strong winding force" applied to the mandrel during winding of the electrodes, as described in the Machida patent. (col.5, line 42.).

Appellants do not believe one of ordinary skill in the art would be motivated to use this reference, as this reference teaches something quite different from the claimed invention. Machida shows a winding process, utilizing two spools that pinch separator material therebetween. This in turn creates a substantial problem with unraveling of the wound subassembly, because when the two spool pieces are removed after winding they continue to pinch the separator material. One of ordinary skill might well consider this a significant problem with the Machida device. Machida simply does not treat electrodes gently, and thus the electrodes in Machida have a greater likelihood of being damaged during the winding process. The overall goal in the winding process of appellant's invention is to prevent damage to the electrodes and treat them gently, so as to avoid short circuits. Since Machida does not do this, a person of ordinary skill in the art would in all probability bypass the Machida disclosure entirely, as there would be no desirability in using it to solve the problem of winding anode-cathode sub-assemblies and removing the mandrel without damaging the electrodes.

In addition to all the above factors that weigh heavily against combining the Takeuchi and Machida references, is the fact that combining these references actually teaches away from the claimed invention. If a person of ordinary skill in the art did decide to combine these two references, the resultant product would be quite different from the claimed invention. Such devices would perhaps use the rectangular mandrel of Takeuchi. However, the mandrel would have to be sliced in half so that it could pinch separator material therebetween, as taught by Machida. However, as discussed above, such a two piece mandrel is undesirable.

Hence, appellants believe that the combining of the Takeuchi and Machida is unwarranted under the facts and the controlling case law. Indeed, as discussed above, the facts and controlling case law both weigh heavily in favor of a finding of nonobviousness and thus patentablity.

XI. Conclusion

Thus appellants believe that the invention as claimed is patentable, nonobvious, and not indefinite. Further there has been no showing to combine the references cited by the Examiner, and even if the cited references are combined, they teach away from appellants' claimed invention.

Appellants respectfully request favorable action on this Appeal, and that the claims 1-19 set forth herein be allowed to issue.

Respectfully submitted,

John M. Del Vecchio
Reg. No. 42,475

Hodgson Russ LLP
One M&T Plaza, Suite 2000
Buffalo, New York 14203
716-848-1367
May 29, 2001
BFLODOCS:499355_1 (@P@Z01)

X. APPENDIX

A. Claims (In Amended and Twice Amended Form)

1. (Twice Amended) A method of making an electrode assembly for an electrochemical cell comprising [the steps of]:

a) providing a combination of an elongated anode electrode, an elongated cathode electrode and separator therebetween in a face-to-face relationship wherein one of the anode and cathode electrodes is shorter in length than the other of the anode and cathode electrodes;

b) folding the combination using a mandrel to form an anode-cathode electrode assembly having a jellyroll configuration, said mandrel being of substantially rectangular cross-section having a pair of substantially parallel and planar oppositely-facing surfaces;

c) said folding the combination including a first step of folding the longer one of the electrodes on itself about the mandrel so that the separator on said longer one of the said electrodes contacts both of said oppositely-facing surfaces of said mandrel and subsequent steps of folding both of the electrodes about the mandrel to form the anode-cathode electrode assembly; and

d) so that upon removal of the mandrel in the event any portion of the separator contacted by the mandrel is impaired only portions of the longer one of the electrode can contact each other thereby preventing any electrical short circuit due to the separator being impaired in a cell containing said anode-cathode electrode assembly.

2. The method according to claim 1, wherein said step of providing the anode and cathode with separator therebetween comprises encasing at least one of the anode and cathode in separator material.

3. The method according to claim 2, wherein both of the anode and cathode are encased in separator material.

4. The method according to claim 1, wherein said step of providing the anode and cathode with separator therebetween comprises providing an elongated separator in face-to-face relation with and between the anode and cathode.

5. (Twice Amended) The method according to claim 1, wherein said anode-cathode sub-assembly has an axis in a plane about which said electrodes are folded and is formed to have a curved edge surface that lies in a plane which is parallel to the plane containing the axis for conforming to a curved wall of a casing of an electrochemical cell containing said anode-cathode sub-assembly.

6. The method according to claim 5, wherein each of said anode, cathode and separator is provided with a plurality of scallops along one edge thereof wherein each of said scallops has a curvature corresponding to said curved surface of said anode-cathode sub-assembly.

7. The method according to claim 1, wherein said anode is of alkali metal and further comprising the steps of:

a) placing the anode-cathode sub-assembly in a conductive cell casing of prismatic shape having opposed flat faces;

b) attaching a lead of one of the anode or cathode to the cell casing and connecting a lead of the other of the

anode or cathode to an electrical connector means extending through the casing in an insulated manner;

c) introducing liquid electrolyte to said anode-cathode sub-assembly in said casing; and

d) sealing said casing;

e) whereby a solid cathode liquid electrolyte alkali metal high rate cell is formed including said electrode assembly.

8. (Twice Amended) The method according to claim 7, wherein said casing has a curved wall between the opposed flat faces thereof and wherein said anode-cathode sub-assembly has an axis in a plane about which said electrodes are folded and is formed to have a curved edge surface that lies in a plane which is parallel to the plane containing the axis which conforms to said curved wall of said casing.

9. The method according to claim 8, wherein each of said anode, cathode and separator is provided with a plurality of scallops along one edge thereof wherein each of said scallops has a curvature corresponding to said curved surface of said anode-cathode sub-assembly.

10. The method according to claim 1, wherein said anode is of lithium.

11. (Amended) An electrode assembly for an electrochemical cell comprising the combination of an elongated anode electrode, an elongated cathode electrode and separator therebetween in a face-to-face relationship wound in a prismatic shaped jellyroll configuration wherein at the innermost portion of the assembly one of the electrodes is folded upon itself to define a substantially rectangular-shaped pocket with only separator therein so that in the event that any portion of the separator

within said pocket is damaged only portions of said one electrode can contact each other thereby preventing an electrical short circuit in a cell containing said anode-cathode electrode assembly.

12. (Amended) An electrode assembly for an electrochemical cell comprising:

a) the combination of an elongated anode electrode, an elongated cathode electrode and separator therebetween in a face-to-face relationship and wound in a prismatic shaped jellyroll configuration;

b) one of the anode and cathode electrodes being shorter in length than the other of the anode and cathode electrodes;

c) the longer of the electrodes being folded upon itself at the innermost portion of the assembly to include two substantially flat sections of the longer electrode facing each other with only a substantially flat section of separator therebetween; and

d) so that in the event of damage to the separator between the two sections of the longer electrode only those two sections can contact each other thereby preventing any electrical short circuit in a cell containing said anode-cathode assembly.

13. (Amended) A solid cathode liquid electrolyte alkali metal high rate cell comprising:

a) a casing of electrically conductive material and of prismatic shape having opposed flat faces;

b) an electrode assembly comprising the combination of an elongated anode electrode, an elongated cathode electrode and separator therebetween in a

face-to-face relationship wound in a prismatic shaped jellyroll configuration wherein at the innermost portion of the assembly one of the electrodes is folded upon itself to define a substantially rectangular-shaped pocket with only separator therein so that in the event that any portion of the separator within said pocket is damaged only portions of said one electrode can contact each other thereby preventing an electrical short circuit in said cell;

c) a non-aqueous liquid electrolyte in said casing and operatively contacting said anode and said cathode;

d) means for electrically connecting one of said anode or cathode to said casing;

e) means for electrically connecting the other of said anode or cathode to an electrical connector means extending through said casing in an insulated manner; and

f) means for hermetically sealing said casing.

14. A cell according to claim 13, wherein said anode is of lithium.

15. A cell according to claim 13, wherein said anode is connected electrically to said casing to provide a cell of case negative electrical configuration.

16. (Twice Amended) A cell according to claim 13, wherein said casing has a curved wall between the opposed flat faces thereof and wherein said anode-cathode sub-assembly has an axis in a plane about which said electrodes are folded and has a curved edge surface that lies in a plane which is parallel to the plane containing the axis which conforms to said curved wall of said casing.

17. A cell according to claim 16, wherein each of said anode and cathode has a plurality of scallops along one edge thereof wherein each of said scallops has a curvature corresponding to said curved surface of said anode-cathode sub-assembly.

18. A cell according to claim 17, further including an elongated separator between said anode and cathode and having a plurality of scallops along one edge thereof wherein each of said scallops has a curvature corresponding to said curved surface of said anode-cathode sub-assembly.

19. (Amended) A cell according to claim 13, in combination with an implantable cardiac defibrillator.